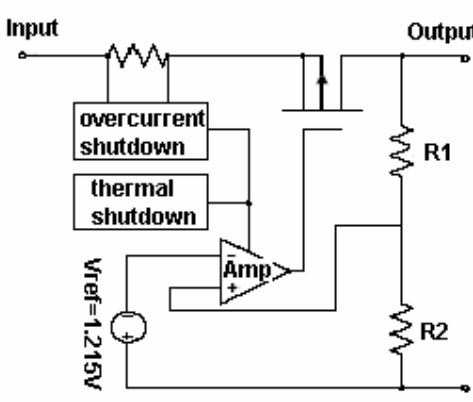
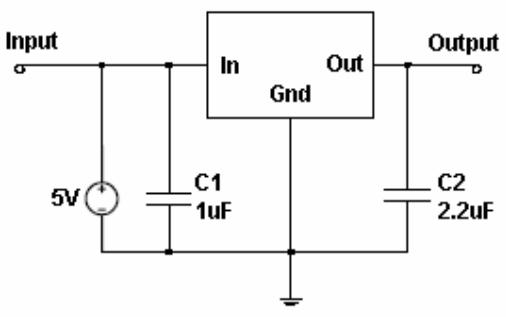


 TO-92	<h1 style="text-align: center;">TS9000/TS9000A</h1> <h2 style="text-align: center;">300mA CMOS Low Dropout Voltage Regulator</h2>																							
	Pin assignment  TS9000 1. Gnd 2. Input 3. Output TS9000A 1. Input 2. Gnd 3. Output	Pin assignment  SOT-89 TS9000 1. Gnd 2. Input 3. Output TS9000A 1. Output 2. Gnd 3. Input	Pin assignment  SOT-23 TS9000 1. Input 2. Output 3. Gnd TS9000A 1. Gnd 2. Output 3. Input																					
General Description																								
<p>The TS9000/TS9000A series is a positive voltage regulator developed utilizing CMOS technology featured low quiescent current, low dropout voltage and high output voltage accuracy. Built in low on-resistor provides low dropout voltage and large output current. A 2.2uF or greater can be used as an output capacitor.</p> <p>The TS9000/TS9000A series are prevented device failure under the worst operation condition with both thermal shutdown and current fold-back. These series are recommended for configuring portable devices and large current application, respectively.</p> <p>This series are offered in 3-pin TO-92, SOT-89 and SOT-23 package.</p>																								
Features <ul style="list-style-type: none"> ◊ Dropout voltage typically 0.4V @$I_o=300mA$ ◊ Output current up to 300mA ◊ Low quiescent current ◊ Output voltage trimmed before assembly ◊ Internal current limit ◊ Thermal shutdown protection 	Ordering Information <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Part No.</th> <th style="text-align: center;">Operating Temp. (Ambient)</th> <th style="text-align: center;">Package</th> </tr> </thead> <tbody> <tr> <td>TS9000<u>X</u>CT</td><td style="text-align: center; vertical-align: middle;">-40 ~ +85 °C</td><td style="text-align: center;">TO-92</td></tr> <tr> <td>TS9000<u>X</u>CX</td><td style="text-align: center; vertical-align: middle;"></td><td style="text-align: center;">SOT-23</td></tr> <tr> <td>TS9000<u>X</u>CY</td><td style="text-align: center; vertical-align: middle;"></td><td style="text-align: center;">SOT-89</td></tr> <tr> <td>TS9000A<u>X</u>CT</td><td style="text-align: center; vertical-align: middle;"></td><td style="text-align: center;">TO-92</td></tr> <tr> <td>TS9000A<u>X</u>CX</td><td style="text-align: center; vertical-align: middle;"></td><td style="text-align: center;">SOT-23</td></tr> <tr> <td>TS9000A<u>X</u>CY</td><td style="text-align: center; vertical-align: middle;"></td><td style="text-align: center;">SOT-89</td></tr> </tbody> </table> <p>Note: Where <u>X</u> denotes voltage option, available are K=2.5V, M=2.7V, N=2.8V, P=3.0V, S=3.3V, U=3.5V, V=3.6V, X=3.8V. Contact factory for additional voltage options.</p>			Part No.	Operating Temp. (Ambient)	Package	TS9000 <u>X</u> CT	-40 ~ +85 °C	TO-92	TS9000 <u>X</u> CX		SOT-23	TS9000 <u>X</u> CY		SOT-89	TS9000A <u>X</u> CT		TO-92	TS9000A <u>X</u> CX		SOT-23	TS9000A <u>X</u> CY		SOT-89
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Applications <ul style="list-style-type: none"> ◊ Battery power equipment ◊ Personal communication devices ◊ Home electronic appliances ◊ PC peripherals ◊ CD-ROM ◊ Digital signal camera 	Block Diagram 																							
Typical Application Circuit 																								



Absolute Maximum Rating

Input Supply Voltage	Vin	+7	V
Output Current	Io	P _D / (Vin – Vo)	V
Power Dissipation	SOT-23	0.3	W
	SOT-89	0.5	
	TO-92	0.65	
Thermal Resistance	SOT-23	325	°C/W
	SOT-89	180	
	TO-92	160	
Operating Junction Temperature Range	T _j	-40 ~ +150	°C
Storage Temperature Range	T _{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260 °C)		10	S

Caution: Stress above the listed absolute rating may cause permanent damage to the device.

Electrical Characteristics

T_a = 25 °C unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Unit
Output Voltage	Vin=Vo + 0.3V, 1mA ≤ Io ≤ 300mA,	0.985 Vo		1.015 Vo	
Input Supply Voltage		Vo+0.3V	--	7	V
Output Voltage Temperature Coefficient		--	40	--	ppm/°C
Line Regulation	Vo+1V ≤ Vin ≤ Vo+2V, Io=5mA	--	0.02	0.1	%
Load Regulation	1mA ≤ I _L ≤ 300mA	--	0.2	1.0	%
Dropout Voltage	Io=300mA, Vo=Vo-2%	--	--	400	mV
Quiescent Current	Vin=5V, Io=0A	--	30	50	uA
Short Circuit Current	Vout < 0.4V	--	300	400	mA
Output Noise		--	20	--	uVRms
Power Supply Rejection Ratio	At 1KHz	--	55	--	dB

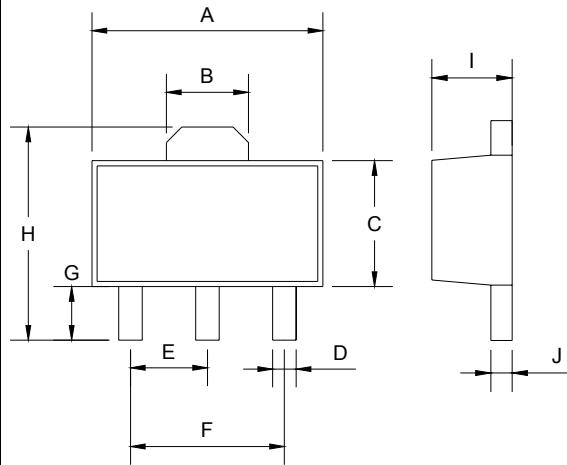
Detail Description

The TS9000/TS9000A series of CMOS regulators contain a P-MOS pass transistor, voltage reference, error amplifier, over current protection and thermal shutdown.

The TS9000/TS9000A series switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over stress. The TS9000 also incorporates current fold-back to reduce power dissipation when the output is short circuit. This feature becomes active when the output drops below 0.8V, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8V.

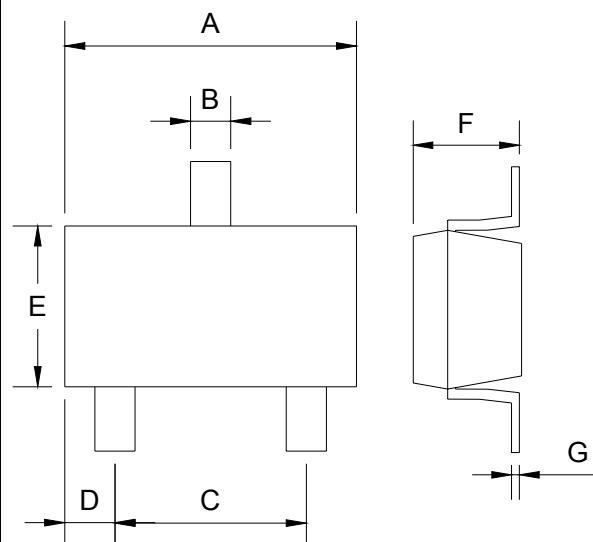
The internal P-channel pass transistor receives data from the error amplifier, over current shutdown and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over current and thermal shutdown circuits become active when the junction temperature exceeds 150 °C, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110 °C.

SOT-89 Mechanical Drawing

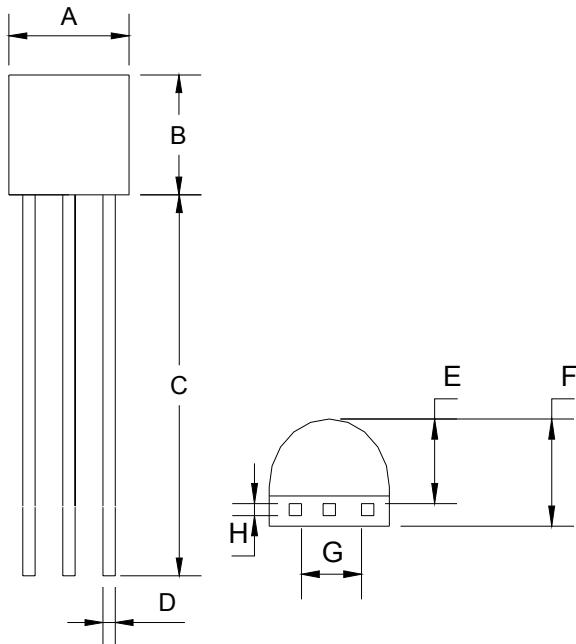


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.50	1.7	0.059	0.070
C	2.30	2.60	0.090	0.102
D	0.40	0.52	0.016	0.020
E	1.50	1.50	0.059	0.059
F	3.00	3.00	0.118	0.118
G	0.89	1.20	0.035	0.047
H	4.05	4.25	0.159	0.167
I	1.4	1.6	0.055	0.068
J	0.35	0.44	0.014	0.017

SOT-23 Mechanical Drawing



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.88	2.91	0.113	0.115
B	0.39	0.42	0.015	0.017
C	1.78	2.03	0.070	0.080
D	0.51	0.61	0.020	0.024
E	1.50	1.70	0.059	0.067
F	1.04	1.08	0.041	0.043
G	0.07	0.09	0.003	0.004

TO-92 Mechanical Drawing

DIM	TO-92 DIMENSION		INCHES	
	MILLIMETERS		MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017